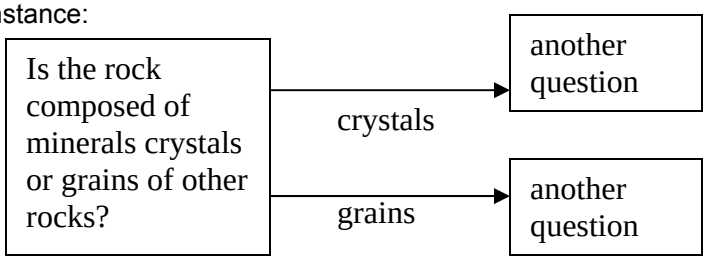
GEOL 350 – Rock Classification Assignment

DUE: In class Tues Apr 3 by each individual student

Goal: Create a flow diagram that students could use to narrow down what type of rock specimens they have before them. It should ask a series of questions that will lead the user to identifying their rock. For instance:



Format: Neat and understandable to someone besides you.

Level of detail: Should allow the user to distinguish between at least 15 different types of rocks (≥5 of each major type).

Rubric (6 points)

_____ Format (3 points)

- Clear and easy to use (3)
- Somewhat difficult to use (2)
- Not usable or barely useable (1)

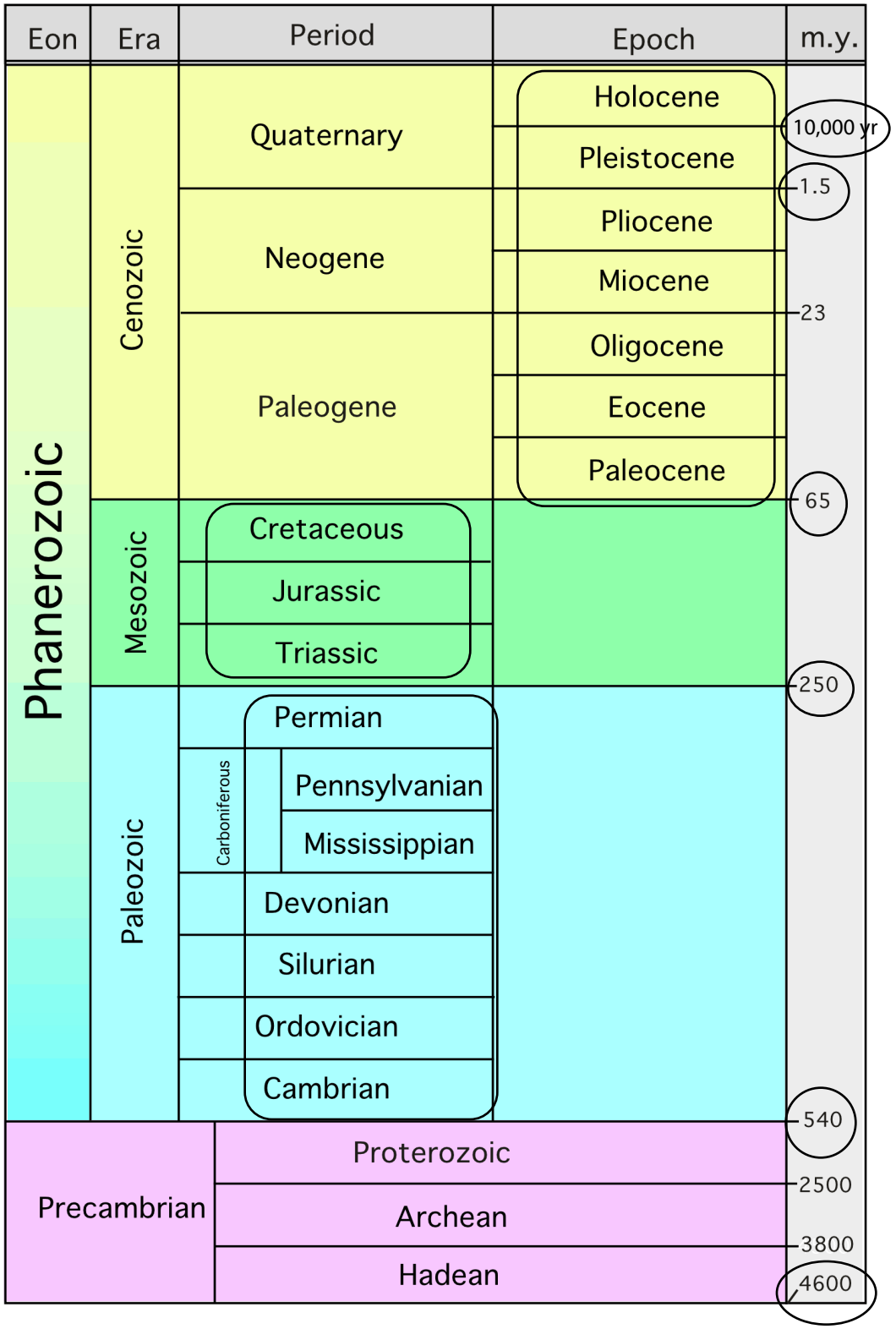
_____ Detail (2 points)

- allows the used to identify at least 15 different types of rocks (2)
- less than 15 rock types (1)

_____ One or both above done exceptionally well (1 point)

Geologic Timescale Assignment

DUE: Mnemonics due in class Tues Apr 3 by each student
Justification: We will regularly be referring to the Geologic Timescale as we cover the geologic history of the Pacific NW. Therefore it is important that you are all familiar with the basic names, order, and key dates in the timesale.
Assignment: Memorize the circled names and dates on this chart and make three mnemonics to help you remember the order of the circled Epochs and Periods.
Rubric (3 points): 1 point for each mnemonic that makes sense and contains the correct letters



Geologic Provinces of the Pacific NW

Purpose: To gain familiarity with the landforms and geology of the Pacific NW by studying several different geologic maps and identifying provinces with similar geologic features.

Instructions

- Work in groups of 3 to decide on a reasonable way to divide the Pacific NW into 7-10 provinces based on landforms, rock type, and rock ages.
- You will work in groups to create a finished map and province description table.
- Each group should have:
    - 1 large *Tapestry of Time and Terrain* map
    - 1-2 colored shaded relief maps
    - 1-2 rock type maps
    - ~5 blank maps of Pacific NW region (some for sketching, 1 for final draft)
    - blank province description table
    - colored pencils (hope you brought them)
- Each group will have a Geomorphologist, a Geochronologist, and a Petrologist who will start by concentrating on the specific map applicable to their discipline. After studying your map for a little while and sketching some ideas, start talking about how to best divide the region as a whole.

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Geologic History of Craig's Hill

Due: Thursday April 9th. One write-up per group.
Work in groups of 2-3. No more than 1 Geology or Earth Science Major per group.

The cycle that you should go through in a scientific investigation is:

1. OBSERVE
2. ASK QUESTIONS
3. PROPOSE POSSIBLE ANSWERS
4. THINK OF ADDITIONAL OBSERVATIONS YOU COULD MAKE TO TEST YOUR PROPOSED ANSWER
5. MORE OBSERVATIONS

In this project, I will start out by giving you the overarching question, but you will come up with (and try to answer) many smaller questions in the process of answering it.

THE QUESTION

What is the geologic history of Craig's Hill? (i.e. What is the sequence of geologic events/processes that are recorded at Craig's Hill?) Define at least 6 geologic events/periods that can be deduced from looking at the Craig's Hill outcrops.

Corollary questions that you should address include:
--Where did the rocks come from that make up Craig's Hill?
--Why is Craig's Hill a hill? (i.e. What is a hill doing in the middle of the Kittitas Valley?)

Your write up will include:

1. ~4-page double-spaced paper describing the sequence of events at Craig's Hill. It should have an Introduction, Description and Interpretation of Observations, and Conclusion sections. You should number your figures and table/s and refer to them in the text of the paper and use them to help provide evidence for your interpretations and conclusions.*
2. Figures and Table/s** – These should include a map of the area with sample sites, photo locations, and/or drawings marked on it. You should label samples sites and make lines and annotations on the photos to help your reader understand your interpretations. You may choose to include more detailed close-up drawings or photographs. If you do, indicate somewhere they were taken. Always refer to your figures in the text. Be sure to include scales to give the reader a rough idea of the size of the photograph. You

should include at least one table describing your samples (see below for sample)

*It is ok to admit you are not certain about a given formation's origin, but based on the observations you X is the best educated guess.

**All the maps and photos are available for download on Bb if you need to make cleaner copies for your final write up.

Example of a good description and interpretation

The lowest formation at ExampleHill (Formation A) is visible at the north end of the study area (Site #1 in Figure 1). It is approximately 4 meters thick and extremely poorly sorted (Figure 2). The sediments range in size from mud to boulders and in rounding from angular to sub-round. Analysis of sample BPS-EH-02 (Table 1) shows that it contains clasts of limestone, granite, and sandstone. We interpret this deposit to be glacial in origin because of the poor sorting, range of surface textures, and variety of included rocks. A landslide could also have created a deposit with the poor sorting, but the variety of rock types and location well away from the valley walls suggest that it is a glacial moraine. Granite and limestone can only be found to the northeast of the study site (Figure 3), so we suggest that this is the mostly likely source area for the glaciers.

Rubric (50 points)

_____Introduction (3 points)

- Clearly describes the intent of the study and the basic location and appearance of the study site in one to two paragraphs. (3)
- Partially describes the purpose of the study and location and appearance of the study site. (1-2)

_____Description and Interpretation of Observations (6 geologic periods x 3 = 18 points)

- Description of each formation is thorough and clear and is followed by an interpretation based on evidence from the observations (3)
- Descriptions are partially clear but observation and interpretation are somewhat intermixed or evidence not completely provided. (2)
- Descriptions are not clear and/or organization is difficult to follow. (1)

_____Conclusion (5 points)

- Clearly summarizes the study and lists the six or more identified geologic events/periods that were concluded based on observations in 1-2 paragraphs and a bulleted list. (5)
- Partially summarizes the study and/or does not include a clear list of the geologic events/periods that were concluded (3-4)
- Conclusion section titled, but does not really address the study. (1-2)

_____Figures (15 points)

- Neat and easy to read; referred to in the text in numerical order (12-15)

_____Table/s (5 points)

- Neat and easy to read; referred to in the text; contain clear observations and interpretations (4-5)
- Hard to read or fairly messy; not referred to in the text; observations and interpretations are intermixed or unclear (2-3)

_____Thorough proofreading and clear write-up structure (2 points)

_____Does one or more of the above exceptionally well (2 points)

Observations and Interpretations of Sedimentary Units from Craig's Hill

Collect and label 5-8 samples to bring back with you. Use the labeling format *Initials-Place-Number*. For example, my first sample would be *BPS-CH-01*.

Sample number	Where was sample collected? In which layer? (Label on sketch)	Observations/Description --what are its characteristics? --what type of rocks and/or sediments does it include?	Interpretation - Environment of formation

Preparing & Teaching & Reflecting on Craig's Hill Field Trip Assignment for 9th Graders

PREP – DUE: Thursday April 12th in class
Type up at least 3 ideas for implementing a field trip at Craig's Hill. Based on your own (very recent) experience, how do you think the assignment should be modified? Come prepared to discuss and come to an agreement with your fellow classmates on what you will do there with the 9th graders next week. You will be working as a class on my laptop to create the assignment that you will use.

TEACHING – Tues & Thur Apr 17 & 19th
Meet at the Ellensburg High School office (1203 East Capitol Avenue, Ellensburg, WA 98926 509.925.8300) at **12:25pm**. We will find Jeff Hashimoto's classroom together. His classes will be 12:35-1:45pm. Arrive on time, wearing appropriate clothing, and be prepared to teach. When teaching, do your utmost to engage the students in trying to answer the questions at hand. TRY NOT TO GIVE AWAY ANSWERS. Try to get the su

REFLECTION – DUE: Tues Apr 24
Write a ~2 page reflection that includes teaching strengths, teaching weaknesses, and plans for improving this and/or other field trips in the future. Include specific examples of occurrences while leading the 9th graders to provide evidence for stated strengths and weaknesses.

Rubric (100 points)
_____Preparation ideas (5 points)
- Type up 3 or more ideas for running the Craig's Hill Field Trip with 9th grades; Ideas are thoughtfully derived and applicable. (4-5)
- Less than 3 ideas that may not be directly applicable to the Craig's Hill field trip and/or do not appear to be thoughtfully derived. (2-3)

_____Collaborative planning with classmates (15 points)
- Class as a whole develops a workable lab; Individual participated fully in the class planning by making suggestions and working to reach a consensus with classmates on how to run the Craig's Hill field trip. (14-15)
- Class as a whole develops a workable lab; Individual did not participate significantly or did not work well with classmates to reach a consensus with classmates on how to run the Craig's Hill field trip. (11-13)
- Class as a whole developed only a partially workable lab (8-10)

_____Teaching (30 points/day)
- Professional attitude – appropriate clothing, on time, ready to teach, enthusiastic (10)
- Working with the students to encourage them to answer the questions themselves; staying on task with the students (20)

_____Teaching Reflection (15 points)
- Thoughtful evaluation of teaching that includes teaching strengths and weaknesses and ideas for what to do differently in this or other field trips in the future. Includes specific examples of occurrences while leading to provide evidence for stated strengths and weaknesses. (14-15)
- Reflection not thoughtfully written or not including all the required components (12-13)

_____One or more of the above done particularly well. Proofreading must be excellent too for this to be applicable. (0-5 points)

Field Trip Design Project – Pacific NW

DUE
Specific site selection proposal – Plan to talk to me briefly on Thur Apr 12
Write Up & PowerPoint presentation – Probably Monday May 15, but I will give you the final word this Thursday after the middle school teachers get back to me about the WASL schedule (could be as early as Wed April 26)
Bring 10 copies of paper version of field trip guide to share with me and your classmates.

Overview: You will design a geologic field trip that could be run with secondary students or the general public. It needs to be complete enough that another earth scientist could run the trip without you. It will be for a specific site in the Pacific NW that interests you or is near where you expect to live/teach. Keep the trip pretty specific – probably too a single site. If it is a place you can visit this term, it will be that much easier to complete the project. You are welcome to base your trip on materials developed by others, but you need to convert them to the format dictated in this project and *properly reference* them.

Justification: Far too much geology is studied completely out of context – within the confines of classrooms or books. In order to effectively help people learn about geology, it is essential to bring them outside to actually see it and learn to ask/answer questions about it. Designing a field trip can be rather daunting because it can require collecting and sifting through information from a variety of sources. Through designing your own field trip, I hope you will become comfortable with the skills it entails and confident that you can design other field trips in the future. For those of you who intend to teach geology, this project should be one you can actually use in the future.

Intended audience
- The field trip materials should be complete enough that another earth scientist could run the field trip without you.
- The expected field trip attendees should be secondary students or the non-scientific general public – therefore you will need to consider what background knowledge you want to give them before the field trip so that the trip will have more meaning to them.

Project components
1. Materials for another future trip leader (75 pnts)
    a. Introduction that describes the basic scope, audience, and intended learning outcome of the field trip (<1 pg single spaced).
    b. Background geological information – whatever you think is important to inform them of so they can effectively lead the trip (~1 pg single spaced)
    c. Direction for actually leading the trip – provide ideas of how the trip should be pitched to make sense and seem relevant to the attendees. Suggest questions that can be asked to get attendees to think about the geology without giving away the answers immediately.
    d. References
2. Materials for field trip attendees (75 pnts)
    a. Background information – include handouts you will give them and/or information you might include in a lecture or demonstration

i. If you are planning a secondary school field trip, this should be one or more classroom lessons or labs that you will do prior to taking the trip.
ii. If you are planning an informal education or naturalist-style field trip, this may be designed into the start of the field trip.

b. Actual field trip handouts – remember our discussion about providing motivation and direction for field trip attendees. Include motivating questions or specific tasks and observations that each person or small group should make.
c. Visual Aids – because each trip is different, I cannot dictate exactly what each field trip packet will contain, but you will certainly need to include visual aids along the lines of maps, diagrams, photographs, pictures, etc. (clearly labeled of course)
d. References

3. 10 minute class presentation of field trip idea (50 pnts)
   You will present your proposed field trip to the rest of the class. Give the background geologic for the area and explain the key geologic points you are hoping the attendees come away with. Explain how you are going to engage them and then help them reach the intended outcome without giving away the answers too easily. Use PowerPoint. Bring paper copies of your field trip material for each of your classmates (and me).

Picking a good site: Perhaps you already have location in mind – in that case you have it easy. If you only have a general idea of the location of interest, you could start by looking into the location of parks or natural areas in your region. Local geologists from universities and community colleges may also have good suggestions – try calling them. *Roadside Guides* to geology or other local/regional books/pamphlets mention specific sites.

Information Sources

- GEOL 350 library – I will bring a box of potentially relevant books, maps, and brochures to class each day. You may borrow them for a day or so to photocopy sections that you are interested in.
- Scientific papers – If you want more scientific information than the books are able to provide, try searching databases such as *Georef* for relevant papers. You can access *Georef* through the CWU Library webpage (http://www.lib.cwu.edu/databases/)
- Local geologist at companies, universities, and community colleges – call them. Geologists often love to talk about their local area and may know of sites that are interesting but not in official parks. They may also know of locally-used but not officially published field trip guides already in existence.
- Washington Dept of Natural Resources has a number of geological publications (http://www.dnr.wa.gov/base/publications.html)
- Geologic Society of America (http://www.gsajournals.org/gsaonline/?request=get-fieldguides) and other geologic societies sometimes publish field trip guides.
- US Geological Survey Publications (the interface is slow and clunky) http://www.usgs.gov/pubprod/

Pictorial Geologic History of the Pacific NW Assignment

DUE: Thursday April 20 – 1st section
Thursday May 11 – Complete project (to my Geology Dept mail box by 5pm)

Overview: You will create a 10-part written & pictorial geologic history of a region in the Pacific NW that particularly interests you or in which you plan to live/teach. Each part will pertain to one interval of time in your location of interest. You should have at least one interval that predates 150 Ma and at least one in the last 20,000 yr. Otherwise you are free to choose the periods that seem the most interesting/important to you.

Justification: Learning the geologic history of a particular region requires research into a variety of sources such as: regional geology books, scientific papers, local pamphlets and field trip guides, the internet, and geologic maps. This project will not only acquaint you with type of resources you will need to use in the future as your continue to learn about geology on your own, but it will provide you with a personal reference booklet on a region that care about.

Intended audience: Secondary students or the non-scientific general public – therefore, the writing style may be less formal than a typical geology lab exercise. However, make sure that the writing is still clear and understandable.

Project components

1. Cover (5 pnts)
2. Table of Contents (5 pnts)
3. Glossary of geologic terms used (10 pnts)
4. ~1 page (single-spaced) summary of the geologic history for your region (30 pnts)
5. 10 sections, each devoted to one time interval (15 pnts each)

Each section will contain

- Title & relevant time period
- 1-2 pages of pictures that show
    - where/how the rocks from that region were forming at that time
    - what the surface climate, flora, fauna was like
- ½-1 page (single-spaced) describing, in non-technical terms, what was happening geologically, climatologically, and life-wise.
- References for your image and information sources

Format: The project may be done entirely on paper. You may make collages by cutting up images and gluing them together in appropriate ways. You may choose to illustrate the History using colored drawings or painting that you make yourself (depending on talent and interest, I guess). However, you should consider making the booklet in digital form using a program such as Corel Draw or Adobe Illustrator or scanning the ultimate paper product – especially if you are an Earth Science Teaching Major. If it is digital, you will be able to include it more easily in your Teaching Program Portfolio AND it will infinitely reproducible if you decide to use it in your classes in the future.

Grading
You will be evaluated on thoroughness, neatness, and inclusion of appropriate materials. The project must be fully proofread and free from errors.

Information Sources
- Your text book will be one of the best background information sources
- GEOL 350 library – I will bring a box of potentially relevant books, maps, and brochures to class each day. You may borrow them for a day or so to photocopy sections that you are interested in.
- Scientific papers – If you want more scientific information than the books are able to provide, try searching databases such as *Georef* for relevant papers. You can access *Georef* through the CWU Library webpage (http://www.lib.cwu.edu/databases/)
- INTERNET – There are countless great sources on the web (and of course many crummy ones) for information and images that could be used in this project. Below are some I know about. You can also find them on GEOL 350 website under *External Links*. If you find any particularly good ones that are not there, please email them to me so that I can add them for others to use.

Paleomap Project - global plate tectonics and climate through time
http://www.scotese.com/

Geology-related images
http://www.earthscienceworld.org/imagebank/
http://webs.cmich.edu/resgi/
http://skywalker.cochise.edu/wellerr/aawellerweb.htm

Detailed earth history
http://www.nmnh.si.edu/paleo/geotime/main/index.html